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(54) **MODULAR OVERHEAD STORAGE**

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See application file for complete search history.

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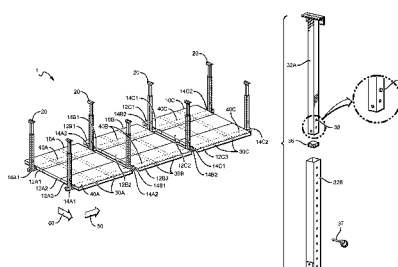
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(57) **ABSTRACT**

A storage system comprises a rack of multiple platforms connectable to one another in a first direction, where each of the platforms has segments that connect to one another along a direction other than the first direction, via a user-operable coupling. The platforms are preferably rectangular, and are connected at their long ends. The segments of each platform are also preferably rectangular, but they are connected along their long sides. In such embodiments, the connection between platforms is perpendicular to the length of the rack, while the connection between segments is parallel to the length of the rack. The segments of individual platforms are preferably coupled together with snap fit connections, and supported from their undersides by transverse supports, and the transverse supports are supported from their undersides by longitudinal supports via recesses on the segments. The transverse supports are preferably perpendicular to the longitudinal supports.

**20 Claims, 6 Drawing Sheets**



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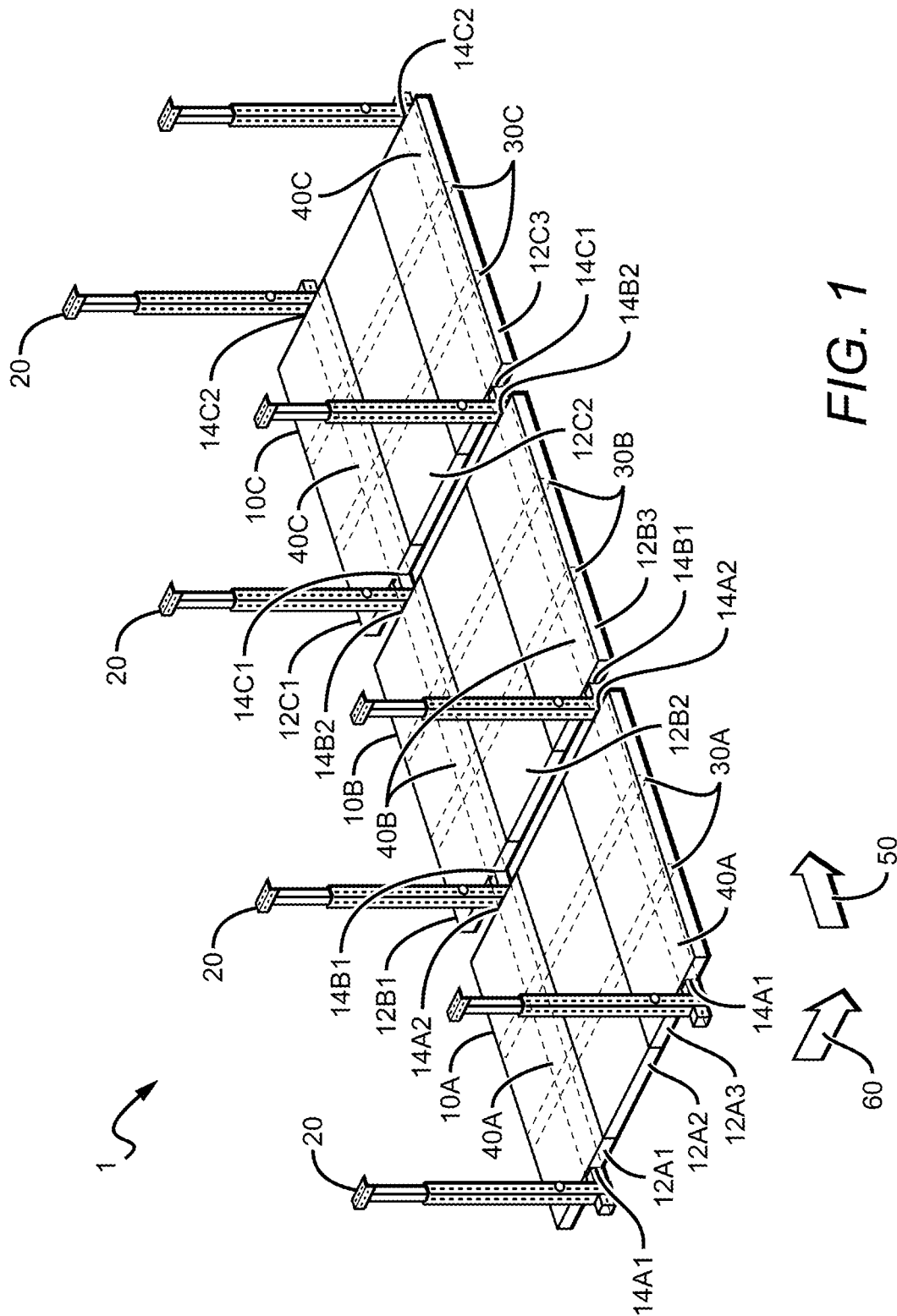


FIG. 2

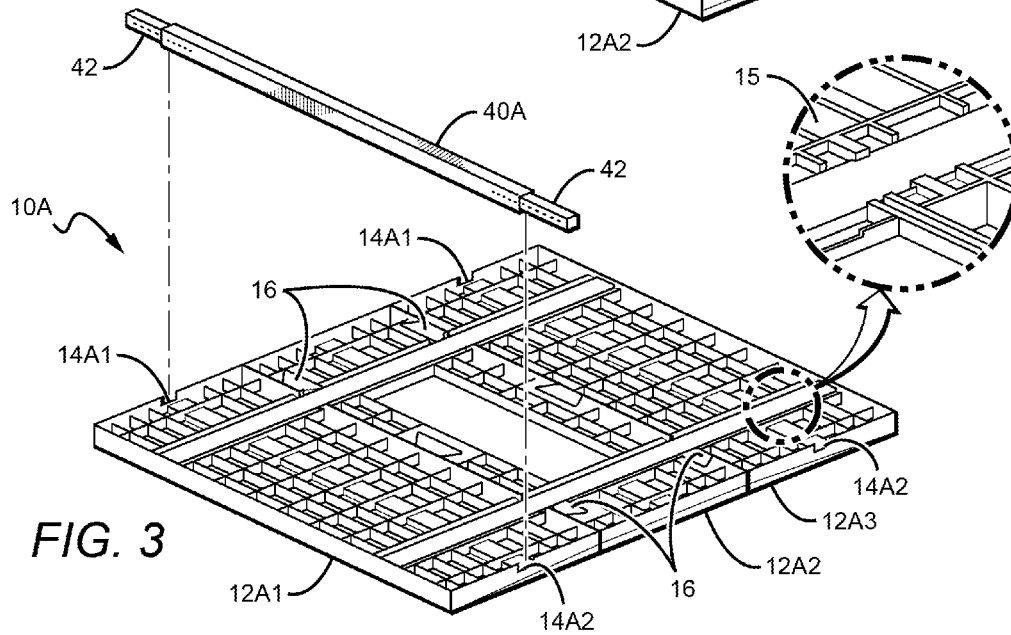
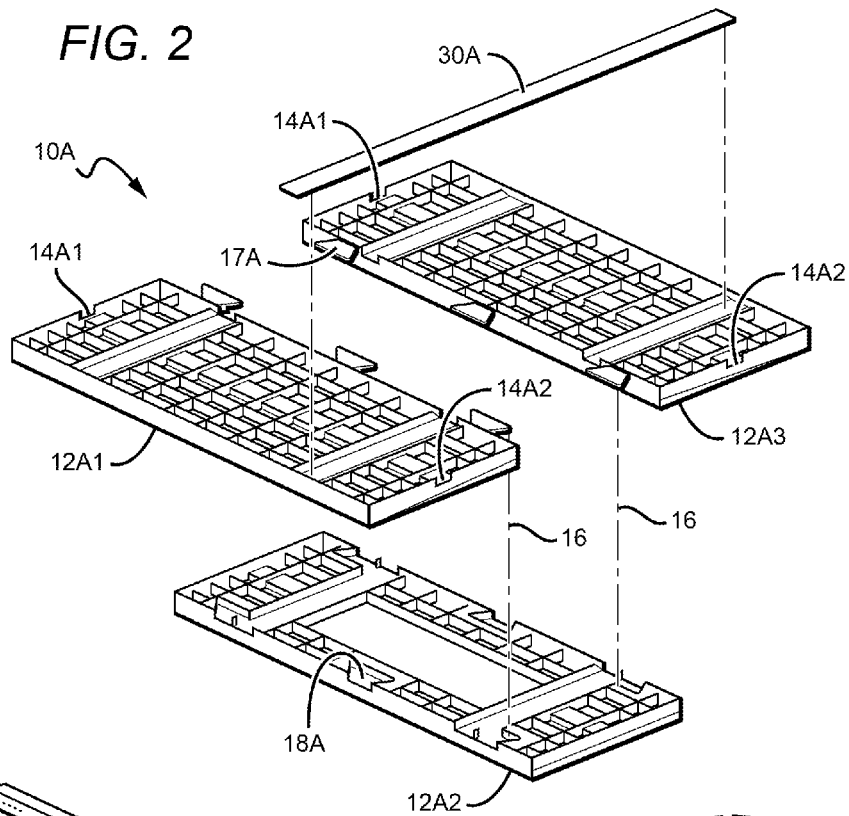
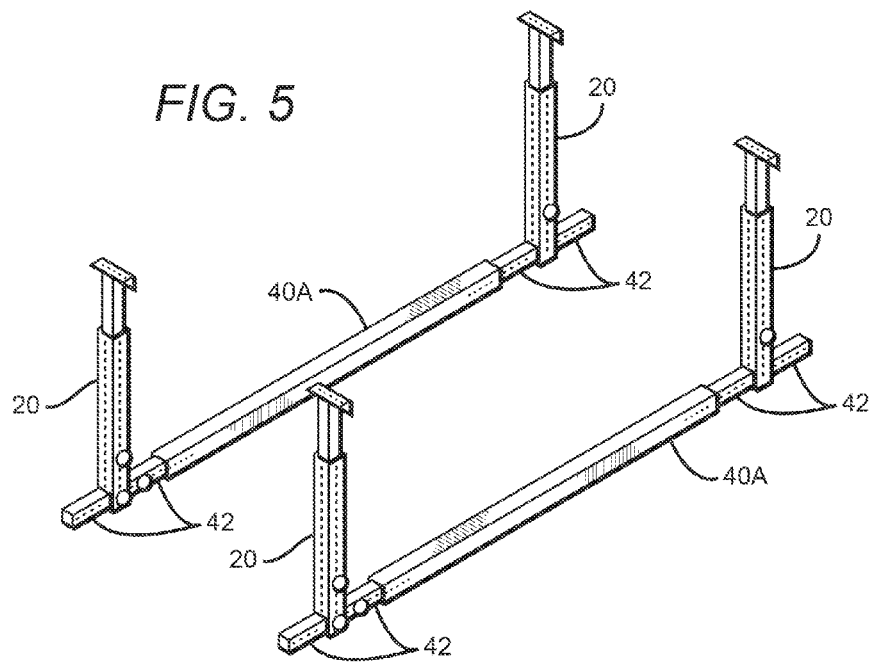
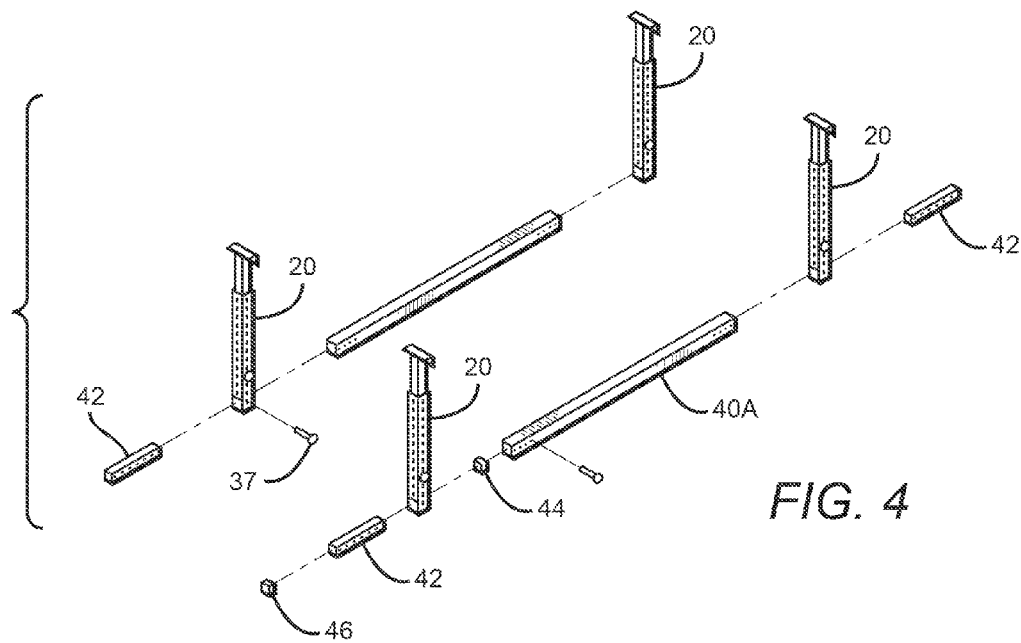


FIG. 3



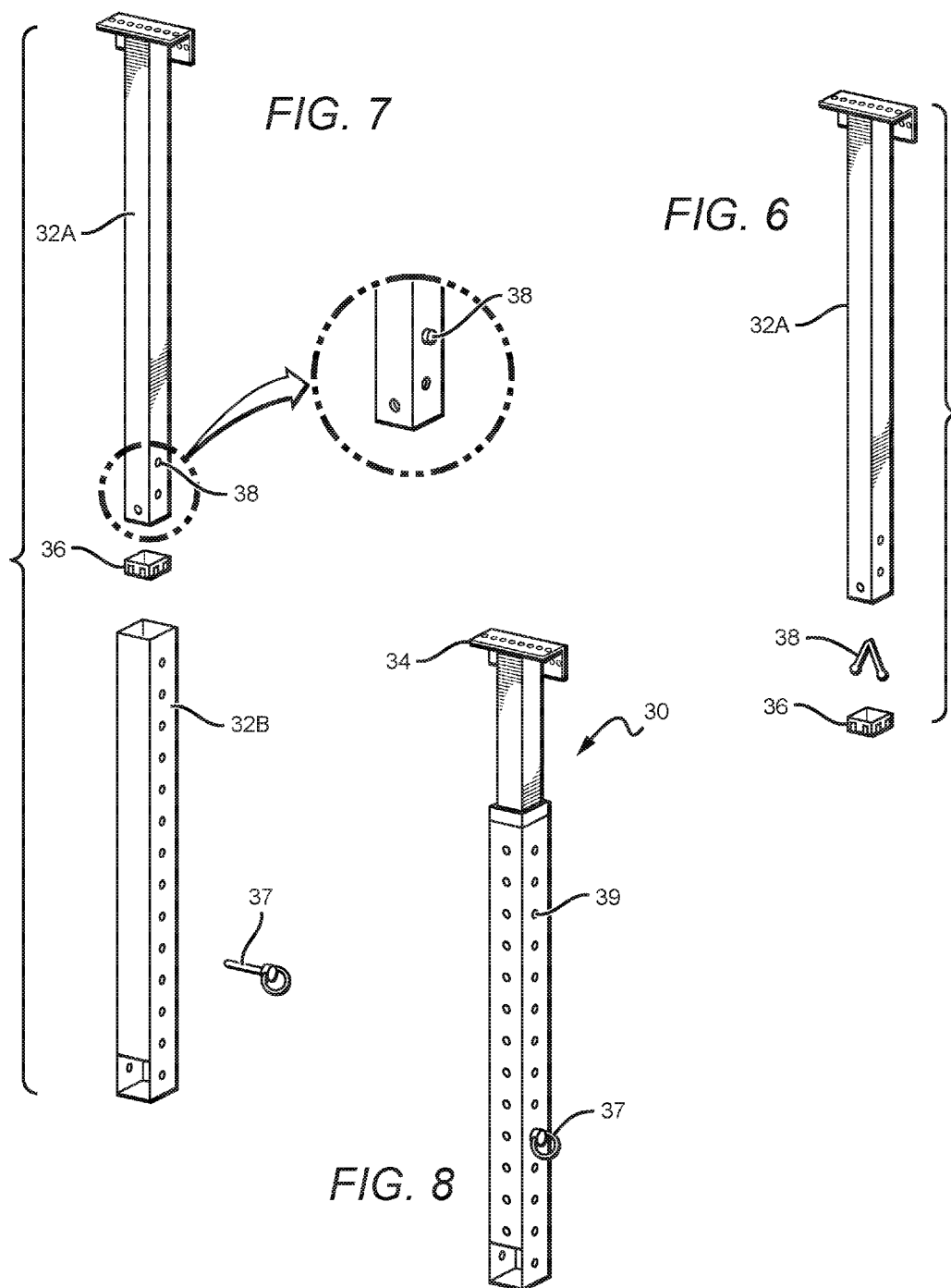


FIG. 9

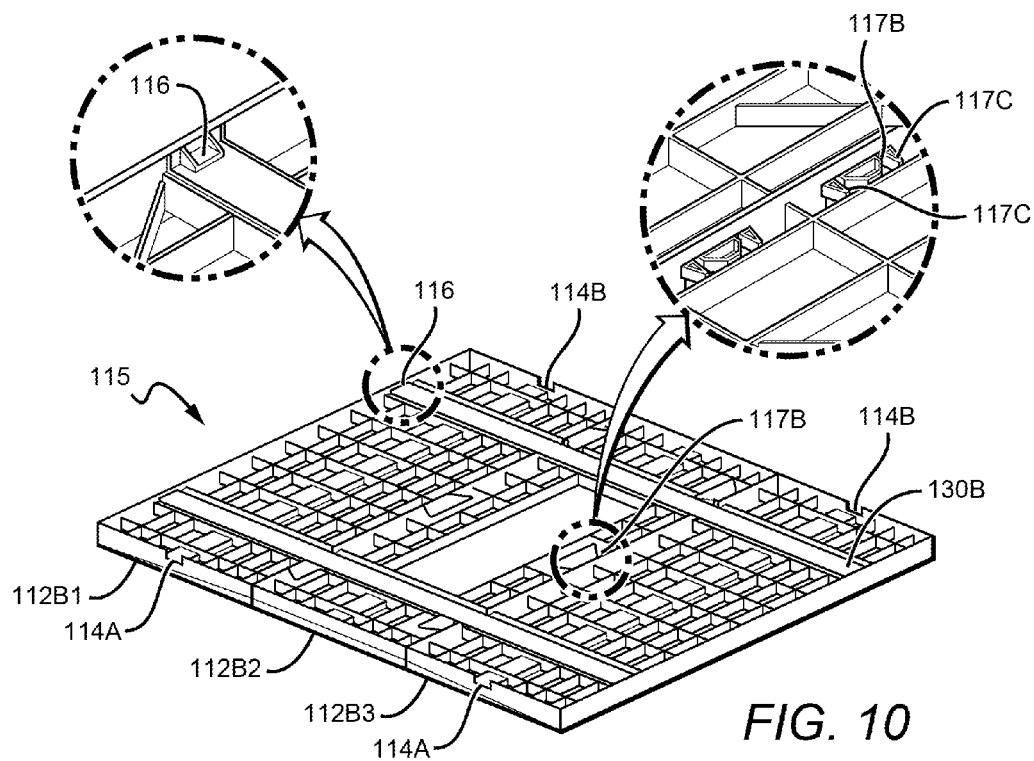
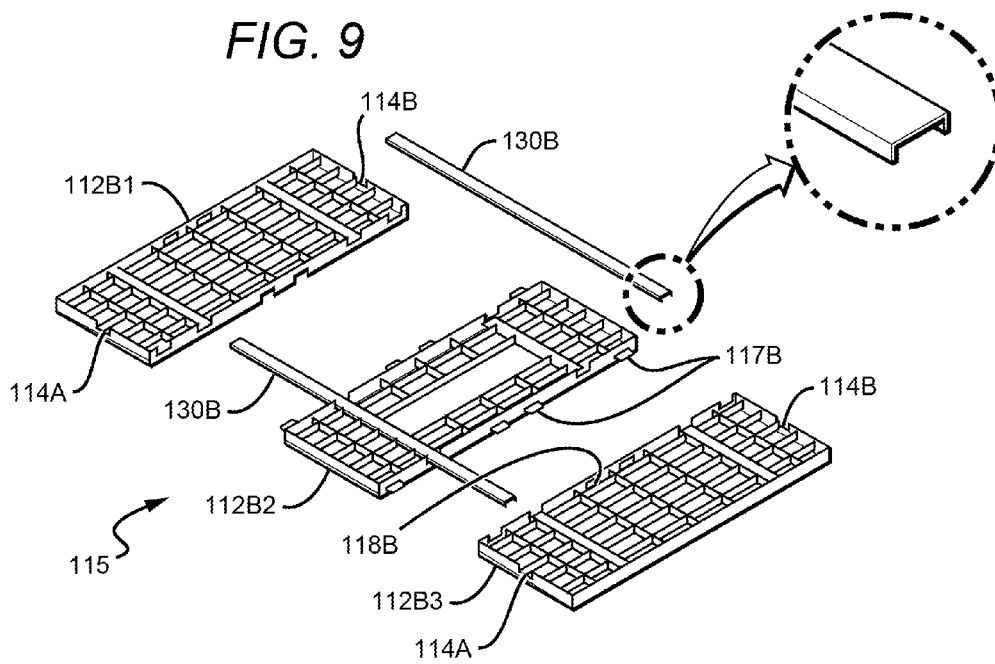
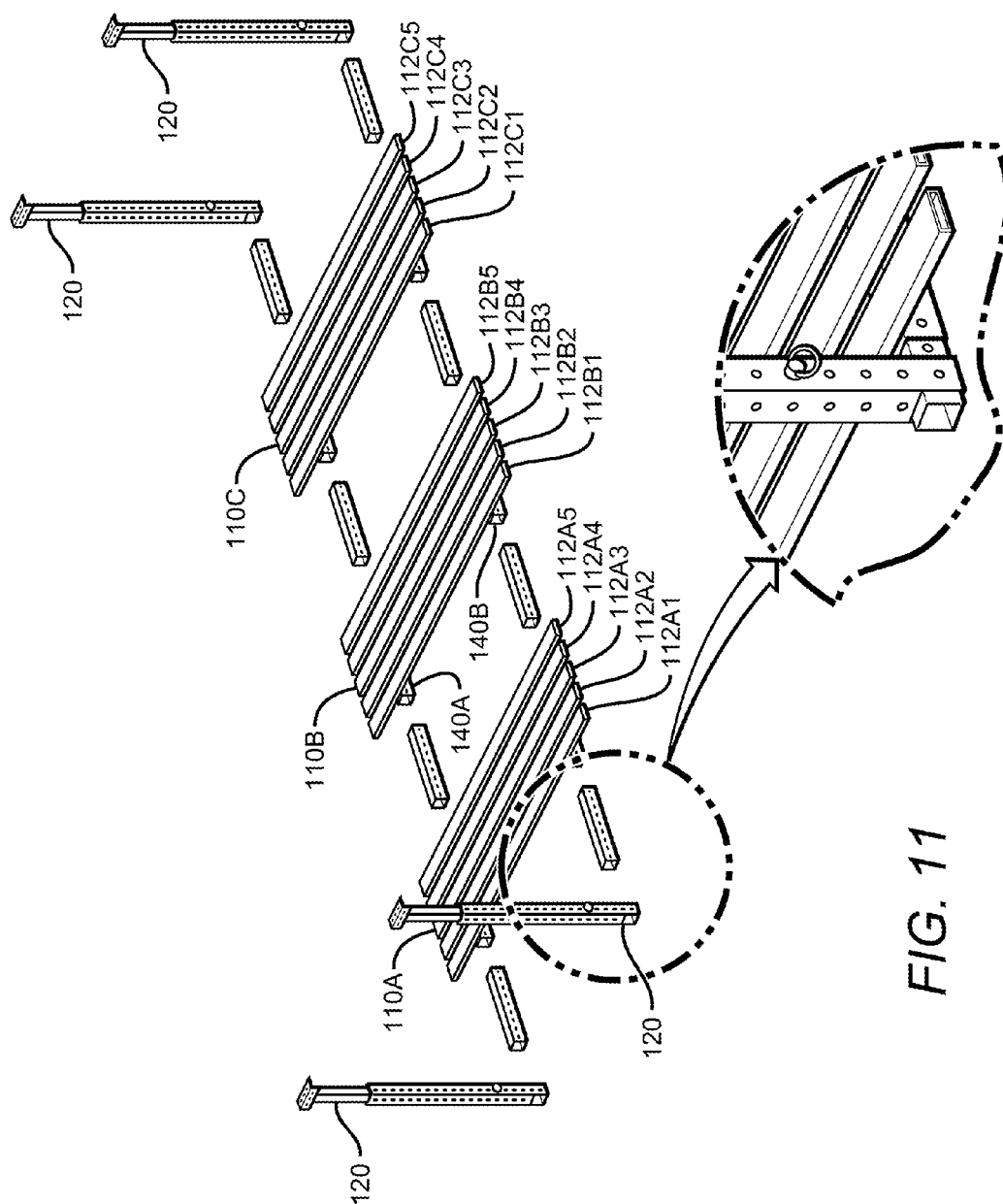


FIG. 10





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**MODULAR OVERHEAD STORAGE**

This application is a continuation of U.S. patent application Ser. No. 14/166,123 filed on Jan. 28, 2014, which is a divisional of U.S. patent application Ser. No. 12/974,801 filed on Dec. 21, 2010, which is a continuation-in-part and claims priority to U.S. patent application Ser. No. 11/479,480 filed Jun. 30, 2006, which claims the benefit of U.S. Provisional Application No. 60/726,746 filed Oct. 14, 2005 and U.S. Provisional Application No. 60/697,468 filed Jul. 7, 2005. These and all other extrinsic materials discussed herein are incorporated by reference in their entirety. Where a definition or use of a term in an incorporated reference is inconsistent or contrary to the definition of that term provided herein, the definition of that term provided herein applies and the definition of that term in the reference does not apply.

**FIELD OF THE INVENTION**

The field of the invention is overhead suspension storage racks.

**BACKGROUND**

Many different types of overhead storage racks are known. Overhead storage racks are typically hung from the ceiling to provide storage space where space is at a premium, such as a garage.

One problem with known storage racks, whether overhead or floor supported, is that the width is limited to that of a single plank, platform, or other member. See, e.g., U.S. Pat. No. 1,260,123 to Areson, U.S. Pat. No. 3,832,957 to Mendenhall, U.S. Pat. No. 6,725,608 to Kraus, and U.S. Pat. No. 7,152,535 to Mikich et al. This causes wholesalers and retailers to stock several different widths to accommodate different user demands, which in turn consumes valuable floor and storage space, and requires higher inventory costs.

Thus, there is still a need for modular overhead storage racks that are relatively compact, allowing desirable retail packing, and assembles easily.

**SUMMARY OF THE INVENTION**

The present invention provides apparatus, systems and methods in which a storage system comprises a rack of multiple platforms connectable to one another in a first direction, where each of the platforms has segments that connect to one another along a direction other than the first direction, via a user-operable coupling.

In a preferred embodiment, the platforms are rectangular, and are connected at their long ends. The segments of each platform are also rectangular, but they are connected along their long sides. In such embodiments, the connection between platforms is perpendicular to the length of the rack, while the connection between segments is parallel to the length of the rack. The segments of individual platforms are preferably coupled together with snap fit connections, and supported from their undersides by transverse supports, and the transverse supports are supported from their undersides by longitudinal supports. The transverse supports are preferably perpendicular to the longitudinal supports.

Each of the platform has end segments that have a series of recesses on its underside. The recesses are to couple a respective segment of a portion of the longitudinal support

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beams or an adjuster of the longitudinal support beams so said portion of the support beams is embedded into the recesses.

Adjacent platforms can be coupled in any suitable manner, including at the ends of the longitudinal supports. Adjacent platforms may, but need not touch one another.

Each of the platforms in the rack can advantageously be supported from above by one, two, or more pairs of legs. Legs can alternatively or additionally be disposed between the platforms. Preferred legs are telescoping, allowing easy adjustment of their lengths. It is further contemplated that the telescoping mechanism can have a finger operable detent that cooperates with a catch to fix the length until the user can insert a secure pin.

In another aspect, a polymeric ring can be advantageously positioned at an end of one of the telescoping components of a leg to reduce noise and vibration. Similarly, polymeric rings can be placed at the ends of the longitudinal supports.

Various objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the invention, along with the accompanying drawings in which like numerals represent like components.

**BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a perspective view of a storage rack having three platforms.

FIG. 2 is an exploded perspective view a platform of FIG. 1.

FIG. 3 is non-exploded view of the platform of FIG. 2. FIG. 4 is an exploded perspective view of a pair of longitudinal supports, and corresponding pairs of legs.

FIG. 5 is a non-exploded perspective view of the pair of longitudinal supports, and corresponding pairs of legs of FIG. 4.

FIG. 6 is an exploded perspective view of a telescoping member of a leg showing a detent and a polymeric ring.

FIG. 7 is a exploded perspective view of a leg

FIG. 8 is a non-exploded perspective view of the leg of FIG. 7.

FIG. 9 is an exploded perspective view an embodiment of the platform of FIG. 1.

FIG. 10 is a non-exploded view of the platform of FIG. 9.

FIG. 11 is a perspective view of an alternative embodiment using aluminum slats instead of plastic platforms.

**DETAILED DESCRIPTION**

In FIG. 1, a storage rack 1 generally includes platforms 10A, 10B, and 10C, and legs 20. Each of the platforms 10A, 10B, and 10C comprises three segments 12A1-12A3 for platform 10A, 12B1-12B3 for platform 10B, 12C1-12C3 for platform 10C. There is a pair of transverse supports 30A-30C underneath each of the platforms, and two longitudinally oriented supports 40A-40C beneath each of the pairs of transverse supports 30A-30C, respectively. The platforms 10A, 10B, and 10C are coupled together at the ends of the longitudinally oriented supports 40A-40C via a series of recesses 14A1-14A2 for segments 12A1 and 12A3, recesses 14B1-14B2 for segments 12B1 and 12B3, 14C1-14C2 for segments 12C1 and 12C3, respectively, and held from above using legs 20.

It should be apparent from FIG. 1 that the various platforms are connected to one another in a first direction 50, whereas each of the platforms has segments that connect to

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one another along a second direction **60**, which is not only different from the first direction **50** but perpendicular to the first direction **50**.

Those skilled in the art will immediately appreciate that rack **1** can be extended or reduced in length by adding or removing platforms. Rack **1** can also be extended or reduced in width by adding or reducing the number of segments in the different platforms. It should even be possible to have a rack with platforms having different lengths and different widths. For adjacent segments having different widths, the longitudinal supports may be coupled using a zigzag connector. It should also be appreciated that the legs on the racks disclosed herein could stand on the floor, or that a side-connecting mechanism could be used to hang a rack on a wall.

Platforms can comprise any suitable material or materials, including, for example, metal, polymers, and so forth. In a preferred embodiment the segments of the platforms are made of lightweight plastic, wire mesh, wood, or any other suitable material. Further, the platforms can have suitable size and configuration, including especially configurations that are sized and dimensioned to accommodate standard cardboard banker's boxes.

In FIGS. **2** and **3** platform **10A** comprises three segments **12A1-12A3**. These segments are shown as being substantially rectangular, but can alternatively have any suitable shape, including for example, square, triangular, or having straight ends and curved or waved sides. Each segment can have any suitable width, but preferably none of the segments is more than 40% of the broadest width of the platform, and more preferably none is more than 30% of the broadest width of the platform. From a marketing standpoint it is desirable for the various segments to be sized and dimensioned for convenient packaging, storage, and transportation.

Segments **12A1-12A3** are shown as having a lattice structure, which is relatively lightweight and is suitable for holding boxes, bags, and so forth. Other structures are also contemplated, including for example, structures with a solid top such as can be constructed using blow-molded plastic with internal baffles. Such structures can be advantageous in that they would prevent a spilled or leaked liquid from flowing down from the platform.

The segments **12A1-12A3** can be coupled in any suitable manner to each other, including simple juxtaposition, snap-fits, tongue and groove, and so forth. In FIGS. **1-3** the various segments are coupled using a snap-fit mechanism **16**, in which the sides of one of an adjacent segments has a mating and interlocking male extension connector **17A**, and the other one of an adjacent segment has a corresponding receiving area **18A**. Another embodiment of coupler is shown in FIGS. **9-10**. Regardless of the mechanism(s) used, it is preferred that the inter-segment couplings are user operable, meaning that a typical end-user can connect and disconnect adjacent segments with a minimum of effort, and most preferably without any tools.

Also shown in FIGS. **1-3**, platforms **10A**, **10B**, and **10C** are connected to the supports **40A**, **40B**, and **40C** via a series of recesses **14A1-14A2**, **14B1-14B2**, and **14C1-14C2**. Recesses **14A1-14A2** are preferably located orthogonally from the snap-fit mechanisms **16**. Preferably, there are two recesses per each of the end segments, but depending on the configuration of the segments, there can be more or less recesses on a given segment to accommodate the supports. As used herein, recesses **14A1-14B1** can be a groove, a slot or any space that has a width and a depth to accommodate the width and the depth of supports **40A**, **40B**, or **40C** or the

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width and the depth of adjuster **42** that is coupled to the supports, respectively for a secure and tight fit. The adjuster or supports can either be coupled to the recesses via a snap-fit mechanism. Regardless of the mechanism(s) used and whether segments **12A1** and **12C** are coupled to supports **40B**, or **40C** or the adjuster **42**, it is preferred that the inter-segment couplings are user operable, meaning that a typical end-user can connect and disconnect each platform and segments from the supports with a minimum of effort, and most preferably without any tools.

As used herein, and unless the context dictates otherwise, the term "coupled to" is intended to include both direct coupling (in which two elements that are coupled to each other contact each other) and indirect coupling (in which at least one additional element is located between the two elements). Therefore, the terms "coupled to" and "coupled with" are used synonymously.

To provide added stability, the segments **12A1-12A3** are preferably molded or otherwise constructed to include col-linear channels on their undersides, which are sized and dimensioned to receive corresponding ones of the transverse supports **30A-30C**. Segments advantageously have fingers **15** that cooperate to help hold the transverse supports to the corresponding segments.

From a marketing standpoint, one or more of the segments can have a logo **19**. Also, while these Figures illustrate a platform having three segments, it should be appreciated that other quantities of segments can be combined to create a platform. Preferably, a platform is made by combining six segments.

Unless the context dictates the contrary, all ranges set forth herein should be interpreted as being inclusive of their endpoints, and open-ended ranges should be interpreted to include commercially practical values. Similarly, all lists of values should be considered as inclusive of intermediate values unless the context indicates the contrary.

FIGS. **4-8** show a pair of longitudinally oriented supports **40A** and four legs **20**. Adjacent supports can be coupled in any suitable manner, but are here shown as being coupled using an adjuster **42**. Preferably adjuster **42** can be an intervening pin or any length of a segment that couples to supports **40A** so as to make the supports longer and more secure. Alternatively, the ends of adjacent supports could be coupled using a sleeve (not shown). To reduce noise and vibration one can also include a polymeric ring **44** about an end of one or more of the supports.

Each of legs **30** generally includes two telescoping members **32A**, **32B**. To reduce noise and vibration one can include another polymeric ring **36** about an end of one or more of the members **32A**, **32B**. Distal ends of legs **30** preferably have corner mount structures **34** to facilitate mounting of the legs to a ceiling, either by horizontally-driven or vertically-driven fastening means, including nails and screws. The legs **30** can advantageously include a finger operable detent **38** that cooperates with a catch **39** to fix a length of the leg **30**. A security pin **37** can be used to lock the telescoping members **32A**, **32B** at a fixed length.

Legs **30** can be coupled to the platforms in any suitable manner. To provide significant strength and stability, legs **30** preferably include a channel through which extends the adjuster **42**, or one or both of adjacent longitudinally oriented supports (not shown). A cap **46** can be used at the terminal end of a longitudinally oriented support or the adjuster **42**.

FIGS. **9-10** show an embodiment of platform **115** having segments **112B1-112B3** that are coupled by snap-fit connectors, the snap-fit connector comprises male member **117B**,

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and female member 118B. The male members 117B has user operable fingers 117C that can be biased by an user to disconnect the segments. In operation, a user would bias the fingers 117C towards each other, thereby enabling the exiting of male member 117B from female member 18B. Recesses 114A-114B located on the ends of segments 112B1 and 112B3 can connect the platform 115 to supports (not shown).

FIG. 9 shows another embodiment of the transverse support. Here, as oppose to a solid flat metal strip as shown in FIG. 2, transverse support 130B is made of sheet metal and has a cross-sectional configuration that enhances structural integrity. FIG. 9 shows a cross-section configuration similar to a "C." Other suitable shapes and configuration are also possible and is readily appreciated by one of ordinary skill in the art to provide structural integrity. The use of sheet metal is also advantageous in that sheet metal transverse support is lighter and easier to manufacture than a solid piece of metal strip.

In FIG. 10, transverse support 130B is secured in place by stop tab 116. Stop tab 116 is disposed on segments that receives the two ends of the transverse support. Here, the two ends of transverse support 130B is received by segments 112B1 and 112B3. Stop tab 116 is a protrusion preferably formed from the segments to keep the transverse support. The function of stop tab 116 is similar to that of finger 15 in FIG. 3.

In FIG. 11, an alternative design of a storage rack 101, generally includes platforms 110A, 110B, and 110C, and legs 120. Each of the platforms 110A, 110B, and 110C comprises five slats 112A1-112A5 for platform 110A, 112B1-112B5 for platform 110B, 112C1-112C5 for platform 110C. There is a pair of longitudinally oriented supports 140A-140B running beneath all of the slats. The longitudinally oriented supports 140A-140B are held from above using legs 120.

The slats can comprise any suitable material, including especially aluminum or other metal, alloy, or composite. Although five appears experimentally to be an optimum number of slats, it is contemplated that one could have platforms with a greater of lesser number of slats than five, and indeed different platforms could have different numbers of slats. Where the slats contain metal, it is considered to be advantageous from weight and cost bases for the slats to be hollow, or to have "I", "C", "E", "H" or other cross-sections.

Thus, specific embodiments and applications of modular overhead storage have been disclosed. It should be apparent, however, to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C . . . and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc.

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What is claimed is:

1. An overhead storage assembly, comprising:

a first longitudinal support beam and a second longitudinal support beam;

a plurality of slats that couple to the first and second longitudinal support beams and that extend from the first longitudinal support beam to the second longitudinal support beam;

a plurality of extendable legs comprising a first leg and a second leg, wherein the first leg is coupled to the first longitudinal support beam and the second leg is coupled to the second longitudinal support beam; and wherein the first leg comprises;

an inner member having a hole sized and dimensioned to receive a detent;

an outer member having an interior space at least partially enclosed by more than two sides of the outer member, a first catch and a second catch that are sized and dimensioned to receive the detent;

wherein a mount structure is coupled to the inner member of the first leg for mounting the first leg to a ceiling; and wherein the first catch and second catch are radially offset from one another along the circumference of the outer member.

2. The assembly of claim 1, wherein when the first catch is aligned with the hole, the detent fixes the inner member to the outer member in a first position and at a first length.

3. The assembly of claim 2, wherein when the second catch is aligned with the hole, the detent fixes the inner member to the outer member in a second position and at a second length.

4. The assembly of claims 3, wherein the first length and second length are different.

5. The assembly of claim 1, wherein the inner member and outer member each have a square cross-sectional shape.

6. The assembly of claim 5, wherein the first catch is on a first side of the square shape and the second catch is on a second side of the square shape.

7. The assembly of claim 6, wherein the first side and the second side are adjacent.

8. The assembly of claim 6, wherein the first side and the second side are opposite.

9. The assembly of claim 6, further comprising a third catch on a third side of the square shape and a fourth catch on the fourth side of the square shape.

10. The assembly of claim 9, wherein the interior space of the outer member is sized and dimensioned to receive the inner member to allow four different rotational orientations of the inner member with respect to the outer member.

11. The assembly of claim 6, further comprising a fifth catch on the first side of the square shape.

12. The assembly of claim 1, wherein the cross-sectional shape of the inner member is geometrically similar to the cross-sectional shape of the outer member.

13. The assembly of claim 1, wherein the first leg further comprises a channel sized and dimensioned to receive and support a portion of the first longitudinal support beam.

14. An overhead storage assembly comprising:

a first longitudinal support beam and a second longitudinal support beam;

a plurality of slats that extend from the first longitudinal support beam to the second longitudinal support beam to provide a platform when coupled to the first and second longitudinal support beams;

a plurality of extendable legs comprising a first leg and a second leg, wherein the first leg is coupled to the first

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longitudinal support beam and the leg is coupled to the second longitudinal support beam; and  
 wherein the first leg comprises;  
 a first member having a cross-section with a geometric shape, and a hole sized and dimensioned to receive a locking mechanism;  
 a second member having a first plurality of catches and a second plurality of catches that are sized and dimensioned to receive the locking mechanism;  
 wherein a mount structure is coupled to one of the first member and second member for mounting the first leg to a ceiling;  
 wherein the first plurality of catches are aligned along a first axis; and  
 wherein the second plurality of catches are aligned along a second axis that is parallel to the first axis.

15. The assembly of claim 14, wherein at least a portion of the first member fits within at least a portion of the second member.

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16. The assembly of claim 14, wherein at least a portion of the second member fits within at least a portion of the first member.

17. The assembly of claim 14, wherein the plurality of extendable legs further comprise a channel sized and dimensioned to receive and support an end of the first longitudinal support beam.

18. The assembly of claim 14, wherein the first and second longitudinal support beams are configured to couple to a third longitudinal support beam and a fourth longitudinal support beam, respectively.

19. The assembly of claim 14, wherein the first plurality of catches are on a first side of the square shape and the second plurality of catches are on a second side of the geometric shape.

20. The assembly of claim 14, wherein the second member has a cross-sectional shape similar to the first member.

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